

the pressure of a gas or the electric resistance of a wire "comes out" negative! To such men the recent introduction of the subjects of heat and electricity by the Board of Mathematical Studies, and the appearance of Thomson's *Electrical Papers*, Maxwell's splendid treatises, and other kindred books, have been happiness indeed. Open any one of these books, at any place, and concoct from it by whatever assumptions (however unphysical) are necessary, a problem which shall lead to an elliptic integral or a Bessel's function, and there you are! This cannot long go on without seriously impairing the progress of physical science in our great mathematical university. Mathematics is, in itself, a right noble and worthy study; but the embryo physicist should, from the first, be taught to regard it as (for him) an indispensable auxiliary only, not a source of natural (?) laws. The whole procedure is thoroughly characteristic of the Cambridge of to-day. It has, among its professors and elsewhere, many of the foremost of living physicists and mathematicians, as well as others destined in time to take similar rank:—but does not utilise them. Even its *one* real test of mathematical merit, real because conducted by such men, the Smith's Prize Examination, has just been abolished! So, it has a magnificent boat at the "head of the river," but *not one member* of that crew is sent to encounter Oxford at Putney! What can be expected, either in the boat-race or in the more arduous toiling over the scientific course, but thorough and most deserved defeat?

Differential Calculus for Beginners, with a Selection of Easy Examples. By Alex. Knox, B.A. (London: Macmillan and Co., 1884.)

THIS little book deserves hearty welcome from those who are engaged in leading forward students to the higher mathematics; not so much as a substitute for any other work at present in use, but as presenting a carefully-selected set of illustrations of infinitesimals, limits, and differential coefficients, which a student may profitably work through before entering upon the usual formal treatises on the calculus.

We know of no work in English comparable with the present since De Morgan's "Elementary Illustrations of the Differential and Integral Calculus."

The special symbols of the subject are not introduced into the work before us, attention being directed to the new principles involved in the method of the calculus; indeed, the chief aim of the author throughout is to give the learner a firm grasp of the idea of a differential coefficient—a fundamental notion which, in the minds of beginners, is usually shrouded in a haze. Care is taken to deal one at a time with the difficulties which present themselves in this subject. The book is divided into twenty sections, the latter two or three dealing with successive differentiation, Maclaurin's theorem, and maxima and minima.

But before new principles or processes are introduced, an endeavour is made to insure a precise comprehension of the meaning of terms already employed by the student. And the freshness of treatment, as well as the clearness with which the author brings before the mind the exact meaning of such terms as "point," "line," "superficies," in the first section of this book, will awaken the interest and arrest the attention of even an indifferent learner.

Many of the sections are independent of each other. There is much variety of illustration, the central principle being looked at from different points of view. A distinguishing feature is the great use made of arithmetical calculations, many examples of the method of finite differences occurring.

Besides the usual geometrical treatment based on Newton's "Lemmas," the ideas of time and motion are freely introduced, and illustrations taken from elementary kinematics.

The book closes with a set of examples worked out in full, and a series of one hundred easy exercises, the answers to which are appended. A. R. W.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

Rock-Pictures in New Guinea

A FEW years ago I mentioned in a paper in *Globus* (lxiii. 94) that Mr. Th. B. Leon had reported the existence of pictures on rocks he had seen in the Ogar and Arguni groups of islands (south part of McCluer inlet), and that the officer in command of H.N.M.S. *Batavia*, who had been charged to make further inquiries, had not been able to find them. At that time Mr. Leon's account had not been published in the regular issue of the *Bataw. Genootschap*. Since then, however, explorations by Mr. van Braam Morris, whilst on his voyage in New Guinea in 1883, and by some of the officers of H.N.M.S. *Samarang*, have resulted in the discovery of rock-pictures similar to those spoken of by Mr. Leon. The papers giving an account of these explorations (including Mr. Leon's) have been published in a recent number of the *Tijdschrift voor Indische Land-, Taal-, en Volkenkunde* (xxix. pp. 582-591), and an abstract of their contents may be interesting.

One day Mr. Leon set out from the kampong (village) of Arguni, situated on the island of that name, for the purpose of fishing. In the beginning, on account of the surf, he kept at a great distance, but the third island of the group he was able to approach. He perceived the distinct representation of a human hand, painted in white, and surrounded with red spots, and other drawings in white, which appeared to be meant for letters, though traced in characters unknown to him. Afterwards, on penetrating between two other islands of the group, he saw several hands, all similar to the first, and accompanied by similar drawings. He was not able to land; he estimated the height of the place at which they were drawn on the rock to be from 75 to 150 feet above sea-level, the hands being about three-quarters of the way up, and the other figures about 10 feet higher still. The hands were of all sizes, representing those of children, of full-grown men, of giants, and were in great numbers. He fancied the characters bore some resemblance to the written signs in use amongst the *Orang Kling*, the *Orang Bugis*, and the *Orang Mangkasser*; they were certainly not *Javan* or *Malayan*. He was greatly puzzled as to how they could have come there, since the face of the rock was perfectly perpendicular, and without any projections or caverns, so far as he could perceive. The only explanation he can suggest is that they must have been done at a time when that part of the rock-surface was nearer to the level of the sea, or the outward form of the rock must have been changed on that side by losing ledges or projections by which the native draughtsmen may have approached the place. It will be readily understood that the natives attribute these drawings to *Kasual*, the prince of evil spirits, who, in their opinion, has his dwelling in one of the small islands, and of whom they are naturally greatly afraid. On another island Mr. Leon discovered a huge stone, which would probably require half a dozen men to lift it, rudely shaped like a bullock, and surrounded with several other stones, evidently arranged on some fixed plan.

Mr. van Braam Morris says:—On September 16, 1883, I came to McCluer inlet, and was told by the native chiefs that the figures I was in search of were to be found on Arguni, or the islands to the west of it. I discovered them on a small island a few hundred yards from the mainland. The shores of both the island and the mainland rose perpendicularly from the water, and in the rocky face of the former, about 5 feet above high-water mark, the surf had eaten out an excavation from 3 to 5 feet wide, thus leaving a narrow platform, on which several small *prahus* were deposited, some of them being 3 feet long. Various figures were drawn on the rock above, especially hands, both of full-grown people and of children. A hand had evidently been sketched in outline from

a living model placed against the wall, and coloured to a depth of 6 inches all around it. The native chiefs who accompanied the Resident said that the remains of the Hill-Papuans had formerly been deposited here, but were now interred with Mahomedan rites; there were indications, however, that some *prahus* had been recently lodged on the platform.

Though the most astonishing part of Mr. Leon's report, viz. the difficulty of drawing the figures on the rock at a considerable height above the sea, is not encountered by Mr. van Braam Morris's experience, it is not proved that the latter explored exactly the same place as Mr. Leon. But just this point (the considerable rising of the islands) is most plainly stated with regard to the Ke Islands by Messrs. Alliol, Mol, van Slooten, Meijboom, and Deijl, of H.N.M.S. *Samarang*, which at the time of their visit lay off Tual ($5^{\circ} 37' 30''$ S. lat. $132^{\circ} 44'$ E. lat.), island of Little Ke. These gentlemen were invited by Mr. Langen, the head of the English settlement there, to visit with him the north-western part of the island; after having steamed for three-quarters of an hour they dropped anchor *vis-à-vis* Kalumit, a village at the base of a hill, about 200 metres high. They went to the top to see there some idols situated in a small settlement. I pass over this part of the narrative, and take it up after they had descended from the edge of the rock, where they had found a burial-place belonging to the kampong, which is on the top. A tolerably well-made flight of ironwood steps allowed the visitors to descend easily; after about half an hour's walk they came to the "necropolis."

On the rock near it they discovered representations in red of various figures—human hands, with the fingers spread out; imitations of human heads; a fight between men armed with *klewangs* (= cutlass), and other figures which they took to be representations of the evil spirits, outlines of ships, &c. Though the heads were rudely drawn, the hands, which were fewer in number, were remarkably well done. The place where the drawings are seem to be quite inaccessible to human beings. In the rock are also caverns which are rather difficult to approach. In one of them two gongs and some pieces of bamboo were found; at the entry fragments of broken glass had been spread, probably to prevent visitors from entering. It must be mentioned that the rock, from the base to the top, was covered with sea-shells. Attention is repeatedly drawn in the report to the circumstance that it seems incomprehensible how the pictures could have been drawn on the rock, which overhangs.

The natives connect the rock-pictures with the burial-place on the top of the cliff. Near the edge of the steep descent stand two houses, which serve as mortuaries, one being close to the dwellings of the natives, which are surrounded with a stone wall. These two houses are built of ironwood; on the roofs there are two pieces of wood, the one in the shape of a prow, the other in the shape of a keel. On the latter are two figures, a dog and a bird; a stick bearing a piece of white cloth is stuck into the bird's body. The walls are 4 and 3 metres, and in the shorter, which faces the sea, there are two doors, through which the coffin is carried; inside this hut they saw two coffins with fruits and a bottle of oil which had been left for the spirits.

The natives, who called themselves Hindoos or heathens, a name which of course has no ethnographical significance, but is merely used to distinguish them from their Mahomedan neighbours, said that when a dead body was placed in the hut the spirit was conducted by the bird or the dog on the roof to the caverns where it is to abide. In token of its arrival the animal draws a figure on the rock. The natives who accompanied the explorers durst not set foot within the caves.

It was also said that the bird and the dog were merely symbols. The soul of the deceased, on leaving the body, flies as a bird through the air or runs as a dog over the earth, till it reaches the abodes of the spirits—the caverns—unseen by living men. Every soul that reaches this haven draws a figure on the face of the cliff. In explanation of the contest between human beings and evil spirits in the pictures, they said that the latter try to prevent the souls from reaching the eternal dwellings; but they cannot hinder those who have led good and honest lives, though those who have done wickedly are carried off by the evil spirits.

The officers, judging from the many articles in gold and silver which were found in the caverns, concluded that they must formerly have been used by pirates as places of refuge and for hiding their stores, and that they were then nearer to the level of the water. On this view the drawings on the rocks would answer a double purpose: they would keep the superstitious from approaching the caves, and would also act as a landmark

for the pirates themselves when returning from sea, and indicate to them the places where their treasure was hidden.

Without hazarding any opinion upon such incomplete accounts, I wish to state, merely by way of summary—

(1) That Mr. Leon's evidence, combined with that of the officers of the *Samarang*, would seem to indicate that the surfaces of certain islands in McCluer inlet and of the Ke group have been considerably elevated.

(2) That the rise has probably taken place at no distant date, but how long since cannot be determined until (perhaps) after close scientific examination.

(3) That Mr. Morris's explorations, taken in conjunction with the foregoing, suggest that the elevation is not a general one, but, though observed at distant points, is limited to certain islands of different groups, or even to particular sides of them.

Stuttgart, March 18

EMIL METZGER

Mr. Lowne on the Morphology of Insects' Eyes

PROF. LANKESTER appears to me to be fighting too much under cover. First he sends his lieutenant into the field, and then he appears himself, in the guise of an independent ally. But inasmuch as he has virtually accused the officers of the Linnean Society of having published a paper unworthy of a place in the *Transactions* of the Society, I feel fully justified in bringing him out into the open.

The anxiety expressed by Prof. Lankester on behalf of the Fellows of the Linnean Society, as to whether my paper was refused by the Royal Society, is manifestly insincere: he knows as well as I do, that the paper was virtually refused by the Royal Society. As Prof. Lankester is taking undue advantage of the secrecy which attaches to the office of referee, I shall state the facts with which I am personally acquainted, and I doubt not these will place the whole matter in a very different light from that which Prof. Lankester has endeavoured to shed upon it.

It is evident Prof. Lankester wishes to make it appear that the rejection of my paper by the Royal Society confirms his strictures and those of his lieutenant, and enables him safely to attack the Linnean Society under cover of the Royal. Now, I believe that every one who was concerned in the publication of my paper knew perfectly well that Prof. Lankester was the first referee to whom it was submitted by the Royal Society. Prof. Lankester wrote to me himself, and stated that the paper had been so referred. Although I then felt sure of its rejection, I should not have had any reason to complain, if the rules of the Royal Society had been carried out, and the paper had been submitted to a second, entirely independent referee. Prof. Huxley, in his opening address to the Royal Society on his election as President, stated that every paper was considered by two entirely independent referees. Now, in my case the second referee was Prof. Schäfer: I do not think it right to refer a paper to two colleagues intimately associated in the same school; and I am sure that no consultation should take place between the referees pending their decision. Yet Prof. Schäfer heard Prof. Lankester's adverse opinions expressed in my presence before he came to any decision himself—at any rate before making any report; and he confessed to me that he had no special knowledge of the literature of the subject on which he was called upon to give an opinion.

Under the circumstances I feel justified in stating that, if the Royal Society had rejected my paper, it would have been a rejection by Prof. Lankester; and I feel sure that an independent referee would have done exactly what was subsequently done on behalf of the Linnean Society.

Prof. Schäfer recommended me to withdraw my paper; I petitioned the Council of the Royal Society to allow me to do so, and the paper was returned to me. If this be a rejection, my paper was rejected.

I then presented it to the Linnean Society, and in so doing I told the Zoological Secretary everything that had happened. The result was that, after some delay, the paper was ordered to be printed in the *Linnean Transactions*.

I could hardly have conceived it possible that any scientific man could have descended to such a device in confirmation of his own views as to pretend that the Royal Society had formed an independent judgment under such circumstances. Prof. Lankester has succeeded admirably in rendering himself impersonal as a representative of the Royal Society—a feat which